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1 Routine/Function Prologues

1.0.1 noah_gridout.F90 (Source File: noah_gridout.F90)

LIS NOAH data writer: Writes noah output in grid space

REVISION HISTORY:

02 Dec 2003; Sujay Kumar, Initial Version

INTERFACE:

```
subroutine noah_gridout(ld,tile,ftn,ftn_stats)
```

USES:

```
use lis_module
use tile_module
use noah_varder

implicit none

type(lisdec) :: ld
type(tiledc) :: tile
integer :: ftn,ftn_stats
```

CONTENTS:

```
do t=1,ld%d%glbnch
  if(noah(t)%forcing(1) < 273.15) then
    rainf(t) = 0.0
    snowf(t) = noah(t)%forcing(8)
  else
    rainf(t) = noah(t)%forcing(8)
    snowf(t) = 0.0
  endif
enddo
!-----
! General Energy Balance Components
!-----
noah%swnet = noah%swnet/float(noah%count)
call tile2grid(noah%swnet,gtmp,ld%d%glbnch,ld%d%lnc,ld%d%lnr,tile)
write(ftn) gttmp !Net shortwave radiation (surface) (W/m2)

call stats(noah%swnet,ld%d%udef,ld%d%glbnch,vmean, &
           vstdev,vmin, vmax)
write(ftn_stats,999) 'SWnet(W/m2)', &
           vmean,vstdev,vmin,vmax

noah%lwnet = (-1)*noah%lwnet/float(noah%count)
```

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call tile2grid(noah%lwnet,gtmp,ld%d%glbnch,ld%d%lnc,ld%d%lnr,tile)
write(ftn) gtmp !Net longwave radiation (surface) (W/m2)

call stats(noah%lwnet,ld%d%udef,ld%d%glbnch,vmean, &
           vstdev,vmin, vmax)
write(ftn_stats,999) 'LWnet(W/m2)',&
           vmean,vstdev,vmin,vmax

noah%qle = noah%qle/float(noah%count)
call tile2grid(noah%qle,gtmp,ld%d%glbnch,ld%d%lnc,ld%d%lnr,tile)
write(ftn) gtmp !Latent Heat Flux (W/m2)

call stats(noah%qle,ld%d%udef,ld%d%glbnch,vmean, &
           vstdev,vmin, vmax)
write(ftn_stats,999) 'Qle(W/m2)',&
           vmean,vstdev,vmin,vmax

noah%qh = noah%qh/float(noah%count)
call tile2grid(noah%qh,gtmp,ld%d%glbnch,ld%d%lnc,ld%d%lnr,tile)
write(ftn) gtmp !Sensible Heat Flux (W/m2)

call stats(noah%qh,ld%d%udef,ld%d%glbnch,vmean, &
           vstdev,vmin, vmax)
write(ftn_stats,999) 'Qh(W/m2)',&
           vmean,vstdev,vmin,vmax

noah%qg = noah%qg/float(noah%count)
call tile2grid(noah%qg,gtmp,ld%d%glbnch,ld%d%lnc,ld%d%lnr,tile)
write(ftn) gtmp !Ground Heat Flux (W/m2)

call stats(noah%qg,ld%d%udef,ld%d%glbnch,vmean, &
           vstdev,vmin, vmax)
write(ftn_stats,999) 'Qg(W/m2)',&
           vmean,vstdev,vmin,vmax
!---
! General Water Balance Components
!---
noah%snowf = noah%snowf/float(noah%count)
call tile2grid(noah%snowf,gtmp,ld%d%glbnch,ld%d%lnc,ld%d%lnr,tile)
write(ftn) gtmp !Snowfall rate (kg/m2s)

call stats(noah%snowf,ld%d%udef,ld%d%glbnch,vmean, &
           vstdev,vmin, vmax)
write(ftn_stats,998) 'Snowf(kg/m2s)',&
           vmean,vstdev,vmin,vmax

noah%rainf = noah%rainf/float(noah%count)
call tile2grid(noah%rainf,gtmp,ld%d%glbnch,ld%d%lnc,ld%d%lnr,tile)

```

```

write(ftn) gtmp !Snowfall rate (kg/m2s)

call stats(noah%rainf,1d%d%undef,1d%d%glbnch,vmean, &
           vstdev,vmin, vmax)
write(ftn_stats,998) 'Rainf(kg/m2s)',&
           vmean,vstdev,vmin,vmax

noah%evap = noah%evap/float(noah%count)
call tile2grid(noah%evap,gtmp,1d%d%glbnch,1d%d%lnc,1d%d%lnr,tile)
write(ftn) gtmp !Evapotranspiration (kg/m2s)??

call stats(noah%evap,1d%d%undef,1d%d%glbnch,vmean, &
           vstdev,vmin, vmax)
write(ftn_stats,998) 'Evap(kg/m2s)',&
           vmean,vstdev,vmin,vmax

noah%qs = noah%qs/float(noah%count)
call tile2grid(noah%qs,gtmp,1d%d%glbnch,1d%d%lnc,1d%d%lnr,tile)
write(ftn) gtmp !Surface Runoff(kg/m2s)

call stats(noah%qs,1d%d%undef,1d%d%glbnch,vmean, &
           vstdev,vmin, vmax)
write(ftn_stats,998) 'Qs(kg/m2s)',&
           vmean,vstdev,vmin,vmax

noah%qsb = noah%qsb/float(noah%count)
call tile2grid(noah%qsb,gtmp,1d%d%glbnch,1d%d%lnc,1d%d%lnr,tile)
write(ftn) gtmp !Subsurface Runoff (kg/m2s)??

call stats(noah%qsb,1d%d%undef,1d%d%glbnch,vmean, &
           vstdev,vmin, vmax)
write(ftn_stats,998) 'Qsb(kg/m2s)',&
           vmean,vstdev,vmin,vmax

noah%qsm = noah%qsm/float(noah%count)
call tile2grid(noah%qsm,gtmp,1d%d%glbnch,1d%d%lnc,1d%d%lnr,tile)
write(ftn) gtmp !Snowmelt (kg/m2s)

call tile2grid(noah%smc(1)*1000.0*0.1+ &
               noah%smc(2)*1000.0*0.3 + &
               noah%smc(3)*1000.0*0.6 + &
               noah%smc(4)*1000.0 -noah%soilm_prev, &
               gtmp,1d%d%glbnch,1d%d%lnc,1d%d%lnr,tile)
write(ftn) gtmp      !DelSoilMoist
call stats(noah%smc(1)*1000.0*0.1+ &
               noah%smc(2)*1000.0*0.3 + &
               noah%smc(3)*1000.0*0.6 + &
               noah%smc(4)*1000.0 -noah%soilm_prev, &

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    ld%d%udef,ld%d%glbnch,vmean,vstdev,vmin, vmax)
write(ftn_stats,999) 'DelSoilMoist(kg/m2s)', &
     vmean,vstdev,vmin,vmax
call tile2grid( noah%sneqv*1000.0-noah%swe_prev,gtmp,&
    ld%d%glbnch,ld%d%lnc,ld%d%lnr,tile)
write(ftn) gtmp      !DelSWE
call stats( noah%sneqv*1000.0-noah%swe_prev, &
    ld%d%udef,ld%d%glbnch,vmean,vstdev,vmin, vmax)
write(ftn_stats,999) 'DelSWE(kg/m2s)', &
     vmean,vstdev,vmin,vmax
!-----
! Surface State Variables
!-----

call tile2grid(noah%avgsurft,gtmp,ld%d%glbnch,ld%d%lnc,ld%d%lnr,tile)
write(ftn) gtmp !Average Surface Temperature (K)

call stats(noah%avgsurft,ld%d%udef,ld%d%glbnch,vmean, &
    vstdev,vmin, vmax)
write(ftn_stats,999) 'AvgSurfT(K)',&
     vmean,vstdev,vmin,vmax

call tile2grid(noah%albedo,gtmp,ld%d%glbnch,ld%d%lnc,ld%d%lnr,tile)
write(ftn) gtmp !Surface Albedo (-)

call stats(noah%albedo,ld%d%udef,ld%d%glbnch,vmean, &
    vstdev,vmin, vmax)
write(ftn_stats,998) 'Albedo(-)',&
     vmean,vstdev,vmin,vmax

noah%swe= noah%swe/float(noah%count)
call tile2grid(noah%swe,gtmp,ld%d%glbnch,ld%d%lnc,ld%d%lnr,tile)
write(ftn) gtmp !Snow water equivalent (kg/m2)

call stats(noah%swe,ld%d%udef,ld%d%glbnch,vmean, &
    vstdev,vmin, vmax)
write(ftn_stats,998) 'SWE(kg/m2)',&
     vmean,vstdev,vmin,vmax
!-----
! Subsurface State Variables
!-----

noah%soilmoist1= noah%soilmoist1/float(noah%count)
call tile2grid(noah%soilmoist1,gtmp,ld%d%glbnch,ld%d%lnc,ld%d%lnr,tile)
write(ftn) gtmp ! Soil water content for layer1 (kg/m2)

call stats(noah%soilmoist1,ld%d%udef,ld%d%glbnch,vmean, &
    vstdev,vmin, vmax)
write(ftn_stats,999) 'SoilMoist1(kg/m2)',&

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vmean,vstdev,vmin,vmax

noah%soilmoist2= noah%soilmoist2/float(noah%count)
call tile2grid(noah%soilmoist2,gtmp,ld%d%glnch,ld%d%lnc,ld%d%lnr,tile)
write(ftn) gtmp ! Soil water content for layer2 (kg/m2)

call stats(noah%soilmoist2,ld%d%udef,ld%d%glnch,vmean, &
           vstdev,vmin, vmax)
write(ftn_stats,999) 'SoilMoist2(kg/m2)',&
           vmean,vstdev,vmin,vmax

noah%soilmoist3= noah%soilmoist3/float(noah%count)
call tile2grid(noah%soilmoist3,gtmp,ld%d%glnch,ld%d%lnc,ld%d%lnr,tile)
write(ftn) gtmp ! Soil water content for layer3 (kg/m2)

call stats(noah%soilmoist3,ld%d%udef,ld%d%glnch,vmean, &
           vstdev,vmin, vmax)
write(ftn_stats,999) 'SoilMoist3(kg/m2)',&
           vmean,vstdev,vmin,vmax

noah%soilmoist4= noah%soilmoist4/float(noah%count)
call tile2grid(noah%soilmoist4,gtmp,ld%d%glnch,ld%d%lnc,ld%d%lnr,tile)
write(ftn) gtmp ! Soil water content for layer4 (kg/m2)

call stats(noah%soilmoist4,ld%d%udef,ld%d%glnch,vmean, &
           vstdev,vmin, vmax)
write(ftn_stats,999) 'SoilMoist4(kg/m2)',&
           vmean,vstdev,vmin,vmax

noah%soilwet= noah%soilwet/float(noah%count)
call tile2grid(noah%soilwet,gtmp,ld%d%glnch,ld%d%lnc,ld%d%lnr,tile)
write(ftn) gtmp ! Total Soil Wetness (-)

call stats(noah%soilwet,ld%d%udef,ld%d%glnch,vmean, &
           vstdev,vmin, vmax)
write(ftn_stats,998) 'SoilWet(-)',&
           vmean,vstdev,vmin,vmax
!-----
! Evaporation Components
!-----
noah%tveg= noah%tveg/float(noah%count)
call tile2grid(noah%tveg,gtmp,ld%d%glnch,ld%d%lnc,ld%d%lnr,tile)
write(ftn) gtmp ! Vegetation transpiration (kg/m2s)

call stats(noah%tveg,ld%d%udef,ld%d%glnch,vmean, &
           vstdev,vmin, vmax)
write(ftn_stats,998) 'TVeg(kg/m2s)',&
           vmean,vstdev,vmin,vmax

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noah%esoil= noah%esoil/float(noah%count)
call tile2grid(noah%esoil,gtmp,ld%d%glbnch,ld%d%lnc,ld%d%lnr,tile)
write(ftn) gtmp ! Bare soil evaporation (kg/m2s)

call stats(noah%esoil,ld%d%udef,ld%d%glbnch,vmean, &
           vstdev,vmin, vmax)
write(ftn_stats,998) 'ESoil(kg/m2s)',&
                     vmean,vstdev,vmin,vmax

noah%rootmoist = noah%rootmoist/float(noah%count)
call tile2grid(noah%rootmoist,gtmp,ld%d%glbnch,ld%d%lnc,ld%d%lnr,tile)
write(ftn) gtmp ! Root zone soil moisture (kg/m2)

call stats(noah%rootmoist,ld%d%udef,ld%d%glbnch,vmean, &
           vstdev,vmin, vmax)
write(ftn_stats,998) 'RootMoist(kg/m2)',&
                     vmean,vstdev,vmin,vmax

if(ld%o%wfor.eq.1) then
  call tile2grid(sqrt(noah%forcing(5)*noah%forcing(5)+ &
                      noah%forcing(6)*noah%forcing(6)),gtmp, &
                      ld%d%glbnch,ld%d%lnc,ld%d%lnr,tile)
  write(ftn) gtmp      !Wind
  call stats(sqrt(noah%forcing(5)*noah%forcing(5)+ &
                  noah%forcing(6)*noah%forcing(6)), &
                  ld%d%udef,ld%d%glbnch,vmean,vstdev,vmin, vmax)
  write(ftn_stats,999) 'Wind(m/s)', &
                     vmean,vstdev,vmin,vmax

  call tile2grid(rainf, &
                 gtmp,ld%d%glbnch,ld%d%lnc,ld%d%lnr,tile)
  write(ftn) gtmp      !Rainf
  call stats(rainf, &
             ld%d%udef,ld%d%glbnch,vmean,vstdev,vmin, vmax)
  write(ftn_stats,998) 'Rainf(kg/m2s)', &
                     vmean,vstdev,vmin,vmax

  call tile2grid(snowf, &
                 gtmp,ld%d%glbnch,ld%d%lnc,ld%d%lnr,tile)
  write(ftn) gtmp      !Snowf
  call stats(snowf, &
             ld%d%udef,ld%d%glbnch,vmean,vstdev,vmin, vmax)
  write(ftn_stats,998) 'Snowf(kg/m2s)', &
                     vmean,vstdev,vmin,vmax

  call tile2grid(noah%forcing(1),gtmp,ld%d%glbnch,ld%d%lnc,ld%d%lnr,tile)
  write(ftn) gtmp      !Tair

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call stats(noah%forcing(1),ld%d%udef,ld%d%glbnch,vmean,vstdev, &
           vmin, vmax)
write(ftn_stats,999) 'Tair(K)', &
           vmean,vstdev,vmin,vmax
call tile2grid(noah%forcing(2),gtmp,ld%d%glbnch,ld%d%lnc,ld%d%lnr,tile)
write(ftn) gtmp          !Qair
call stats(noah%forcing(2),ld%d%udef,ld%d%glbnch,vmean,vstdev, &
           vmin, vmax)
write(ftn_stats,999) 'Qair(kg/kg)', &
           vmean,vstdev,vmin,vmax
call tile2grid(noah%forcing(7),gtmp,ld%d%glbnch,ld%d%lnc,ld%d%lnr,tile)
write(ftn) gtmp          !PSurf
call stats(noah%forcing(7),ld%d%udef,ld%d%glbnch,vmean,vstdev, &
           vmin, vmax)
write(ftn_stats,999) 'PSurf(Pa)', &
           vmean,vstdev,vmin,vmax
call tile2grid(noah%forcing(3),gtmp,ld%d%glbnch,ld%d%lnc,ld%d%lnr,tile)
write(ftn) gtmp          !SWdown
call stats(noah%forcing(3),ld%d%udef,ld%d%glbnch,vmean,vstdev, &
           vmin, vmax)
write(ftn_stats,999) 'SWdown (W/m2)', &
           vmean,vstdev,vmin,vmax

call tile2grid(noah%forcing(4),gtmp,ld%d%glbnch,ld%d%lnc,ld%d%lnr,tile)
write(ftn) gtmp          !LWdown
call stats(noah%forcing(4),ld%d%udef,ld%d%glbnch,vmean,vstdev, &
           vmin, vmax)
write(ftn_stats,999) 'LWdown(W/m2)', &
           vmean,vstdev,vmin,vmax

endif
998   FORMAT(1X,A18,4E14.3)
999   FORMAT(1X,A18,4F14.3)

```